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SCHOOL AND SOCIETY

EDITED BY J. McKEEN CATTELL

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THE EFFECT OF ENVIRONMENT ON INTELLIGENCE[1]

By Professor FRANK N. FREEMAN

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A GENERATION ago it was customary to regard the development of intelligence as one of the cardinal aims in education. It was taken for granted that education served not only to train the pupil in the performance of specific acts or to see to it that he acquired specific items of information; but also to increase his intellectual power, to make him a better thinker, or to make his mind a more effective tool for the performance of any intellectual task to which he might turn his attention. This was the aim of the older, liberal education. College graduates were supposed to be better prepared to succeed in professions, or even in the higher ranks of business, because their college work had fitted them better to grapple with the problems which confront men in these occupations. It was supposed that college men, by virtue of their advanced education, possessed keener discrimination, sounder judgment and more ability to analyze a complicated situation than was possessed by men of more meager educational advantages.

This view of education was held by professional educators and laymen alike. It still prevails among laymen, but has been abandoned by a large number of educators. Not many years ago a prominent psychologist declared that the chief function of education is selection rather than the development of mental ability. The graduate of the high school or of the college, he said, is superior to the individual whose educational career has been cut off at an earlier point, not because these educational institutions have made him superior, but because they have acted as a sieve, sorting out those of weaker intellect and eliminating them in the earlier grades, and retaining those of higher native capacity until later grades. This view is a complete negation of the earlier and broader notion of the aim and function of education. According to this reversal of the traditional aim education does not improve intelligence. Intelligence is something a person is born with and education serves merely to give skill and information.

The conviction of the modern educator that it is impossible to improve the individual's general intelligence and that it is necessary to restrict education to very narrow and specific forms of training is derived from the interpretation of three types of evidence. The first type of evi-

[1] An address delivered before the Harvard Teachers' Association at its thirty-ninth annual meeting in Cambridge on March 29, 1930.

dence is drawn from studies in the transfer of training. The view that education increases the ability to perform intellectual tasks other than those in which the individual is trained was sharply challenged on the basis of certain laboratory experiments. The interpretations of these experiments, together with certain investigations of learning, led to the doctrine that all learning is highly specific. This notion is that learning consists in the formation of particular bonds between definite elements of the external situation and definite motor responses. Each of these bonds is a separate unit of behavior, distinct from every other. A complex action is due to a collection of these simple elements. There is no transfer from one element to another. The only way in which training in one act can improve the performance of another act is through the presence in the second act of certain of these elements which were formed by the performance of the first act. Transfer can take place, then, only through the presence of identical elements in the situation and in the act which was made in response to this situation and in the situation and the act to which the transfer is to be made. This may be called the atomistic theory of learning.

This doctrine of specific training, based on the atomistic theory of learning, has had wide influence on educational thought and practice. It has not only induced educators to attempt to define the aims and outcomes of education in more definite and specific terms, which is highly desirable, but it has also led them to restrict the possibility of education to the development of specific habits or skills and the acquirement of specific items of information, which is very questionable, to say the least. The effect of this narrow point of view may be seen, for example, in the subject of arithmetic. A group of investigators of this subject have demanded the elimination of much of the traditional subject-matter of arithmetic and have therefore been called reductionists. These reformers may object to this term and maintain that their purpose in weeding out the useless topics from this subject has been merely to clear the way for the introduction of more significant material. The general impression which the profession has received from their writings, however, is that their attempt has been to reduce all work in arithmetic to the simple specific operations which could be found in common use among adults, and to teach these simple operations by the most direct, mechanical method which will develop facility in their performance. This reform movement has been in effect, if not in intent, directly opposed to the idea of the rationalization of the arithmetical process, and to the aim of developing in the pupil a general understanding of numerical relations for the purpose of enlarging his intellectual grasp.

Since transfer of training or formal discipline is not the main topic for consideration, there is not time to review the experiments and the arguments upon this subject. Those who have reviewed the literature of the field will, I think, agree that the earlier extreme views of specific training are no longer held by any of the leaders in the field. There are still differences in emphasis, but all would agree that there is clear evidence of transfer of training or of general training. It is pretty generally agreed, furthermore, that this generalization of training may take place in a variety of ways. It is not confined to identical elements. Examples may again be drawn from the subject of arithmetic. The doctrine of specific training has led many to think that every separate operation in arithmetic must be drilled individually. This has been shown not to be true in two specific types of operation. The first is the addition of fractions. Pupils may learn to

add fractions by finding the common denominator, by practicing only on certain of the fractions. It is not necessary to practice all of them. When the pupil has learned the general method of finding the common denominator he can apply it to the addition of any fractions. Again, it has been thought that learning to add numbers in the direct order does not enable pupils to add them in the reverse order. Number combinations in one order have been thought to be quite distinct from the same combinations in the reverse order. A recent experiment has shown that there is almost complete transfer from adding in one order to adding in the reverse order. The pupil acquires a general notion of the numerical relations and is able to apply it in a different situation from the one in which he was trained. The belief that the pupil's intelligence can not be improved because training is entirely specific is contradicted by numerous lines of evidence of which these are but two recent examples.

The second source of the belief that education must confine itself to narrowly specific forms of training is to be found in the biological notion of heredity. Research in the inheritance of physical traits in both plants and animals has yielded a generalization known as the Mendelian Law, which has greatly clarified our notion of the mechanism of inheritance. However, attempts to apply this law to the inheritance of mental traits, as in the case of feeblemindedness, have not been so successful as is their application to the inheritance of physical traits. Future research may or may not show that mental traits are also inherited according to the Mendelian Law. We can assume for the sake of argument that the Mendelian Law does apply to the mental traits as well as to the physical traits. The following argument applies to both equally.

The bearing of the facts of inheritance, and particularly of the Mendelian Law, in their applications to education has been seriously misinterpreted. The common interpretation is that, since physical or mental traits are inherited, those traits which are exhibited by the mature individual are determined entirely by the traits exhibited by his ancestors. The development of the individual is simply the inevitable unfolding of those traits which are implicit in the organism before birth. The environment can have no influence in modifying the individual's growth, and the relative standing of one individual to another in such traits as intelligence, for example, is determined solely by inheritance. If one knew enough about the determiners in the germ-cell and the ovum which unite to form an individual, and about the way they combine, one could predict all the characteristics which the individual would exhibit throughout his life.

This is a thoroughgoing misconception of the facts of inheritance. Each individual may start life with certain potentialities which are determined entirely by inheritance. The potentialities which are possessed by his children may in turn be determined by his inherited potentialities. In other words, these potentialities which are inherited may not be influenced one way or the other by the circumstances of the life of the parent. There may be no such thing as the inheritance of acquired characteristics.

None of these statements, however, means that the adult individual is what he is solely because of his inherited potentialities. The characteristics which he displays as an adult may be the joint effect of his inherited potentialities and of the influences which are brought to bear upon him by the environment. He may, for example, possess at birth certain potentialities in respect to body build. His final height and weight, however, may be influenced by food, by sunshine or by other environmental circumstances. To use the

expression of Professor H. S. Jennings, he has not inherited these characteristics of height and weight since the characteristics which he exhibits as an adult are the joint products of his inheritance and of his environment. Professor Jennings gives numerous illustrations of profound modification in the physical make-up of animals produced by the influence of the environment. If the environment can thus influence the development of physical characteristics, it is probable that it may affect the development of mental characteristics still more. In their judgment concerning the question whether environment has an influence on intelligence, psychologists have been strongly biased in the direction of the view that inheritance is the sole factor. The modern biological conception of inheritance gives no justification whatever for this bias. If we are influenced at all it should be in the opposite direction. So far as biology is concerned, the question is not a closed one. It is one to be answered by direct investigation.

The third source of the view that intelligence is fixed by heredity and is unalterable by education is to be found in the interpretation of intelligence tests. The notion that the ability which is indicated by the score on an intelligence test is determined solely by inheritance crept into the thinking of psychologists and into the popular mind after the use of mental tests had become rather wide-spread. This view was apparently not entertained by Binet, who devised the first usable intelligence scale. It can not be demonstrated from the ordinary tabulation of intelligence test scores themselves. The differences which appear between the scores of individuals or groups of individuals are regularly susceptible to dual interpretation. The fact that one interpretation is regularly chosen to the exclusion of the other is a clear evidence of the bias existing in the mind of the person making the interpretation. The alarm which was felt when the results of the army intelligence tests became known, and when it was widely heralded that 40 per cent. of the population is feeble-minded, is a case in point.

The so-called constancy of the IQ has been commonly accepted as an evidence that intelligence is fixed by inheritance. In point of fact no such conclusion is justified. In the first place, the IQ is only relatively constant. The average fluctuation on a repeated test is four or five points on each side of the initial score. This means that half the fluctuations are more than four or five points either way. Whether one calls this constancy or variableness will depend altogether upon one's point of view. In the second place, constancy in the IQ would only be an evidence that the IQ is determined by heredity if the environment fluctuated enough to lead us to expect marked fluctuation in the IQ. It is probably more common for the environment of the child to be relatively constant throughout his school career. If this is true, constancy of the IQ might merely reflect constancy in the environment instead of the effect of inheritance.

The same possibility of a dual interpretation is found in the case of differences in the average scores of groups of persons on intelligence tests. It is regularly found, for example, that individuals who progress farther in school have a higher intelligence score than those who drop out earlier. This is the basis of the view that the school is merely a selective agency and not an agency for the general development of the mind. According to this notion the superior person advances farther in school because his superior intellect enables him to perform the tasks of the higher grades, whereas the person of inferior intellect is forced to drop out. It is, of course, equally possible to conclude that the student who

advances to the higher grades is of superior intelligence, at least in part, because of his superior education.

Again, it is well known that the children of superior parents have a higher intelligence than children of inferior parents. It is also known that the homes of these superior parents are of a higher grade and offer better advantages than do the homes of inferior parents. The superiority of the children may, in such case, be attributed either to the superior heredity or to the superior home advantages. A similar dual interpretation may be made of the fact that men in different states differ widely in their average intelligence and that the educational advantages, the number of libraries and the circulation of magazines and books in these states correspond to the average intelligence of the inhabitants. Other instances of group contrast are the diversity in the intelligence score of persons in different occupations, of dwellers in the country and dwellers in the city, and of immigrants who have resided in the United States for different periods of time. In all the comparisons which have been cited, the differences may be due to inheritance or to environment or to a combination of the two. The statistical relationships are not of such a nature as to enable us to determine which of the three explanations is the correct one.

The difficulty in the way of determining, in such cases as have been mentioned, whether to attribute the differences in question to heredity or environment is due to the correlation between the two factors. Take, for example, the case of parents and children. A superior inheritance ordinarily goes with a superior environment. We can not, therefore, tell whether the child's superiority is due to the one or the other of these two influences. It is only by a separation of these two factors that we can determine the influence of the one independently of the other.

Such a separation might be made experimentally. We might take one thousand children of known parentage, divide them into two groups of 500 each, and equal so far as we could judge in inheritance, put one group into very poor homes, say in the slums of a large city, and the other group into the best homes available. The comparison between the two groups would then indicate how far differences in environment may affect the intelligence of children.

Such an experiment would, of course, present practical difficulties. Something approaching this separation between the factors of environment and inheritance, however, is to be found in the case of foster children. The inheritance of foster children, particularly of the legitimate group, is known to be low. The average inheritance of illegitimate foster children, while it can not be so completely known, is probably, for reasons which we can not go into here, slightly higher. We may consider chiefly the legitimate group.

The low intellectual status of the parents of these children is to be inferred from a number of circumstances. The very fact that the children are thrown on society to be cared for is one of these. There are, of course, exceptional circumstances in which the child becomes a candidate for adoption and which make no reflection on the parents. In the majority of cases, however, the parents are unable through straitened circumstances or are considered unfit to bring up their own children. This argues, among other things, a low mental ability. This inferential argument is supported by the recorded observations concerning the parents. A large percentage of them are considered by their associates and by the representatives of the child-placing agencies as being mentally below standard. If we may argue from the intelligence of the children to that of the parents, the mental ability of the children themselves

constitutes the third line of evidence. Terman gives the average intelligence quotient of children from very poor neighborhoods, which corresponds to the home surroundings of the majority of these foster children, to be 85. In a study of foster children made at the University of Chicago the average IQ of the children upon commitment to the child-placing agency was 87.

None of these lines of evidence would, of course, enable us to fix, with any degree of exactness, the original mental capacity of the parents of foster children. To conclude that we could determine the exact inherited capacity of the parents from any of these types of evidence would be to assume that intelligence is unalterable by environment, which, of course, is the very point at issue. Without going to this length we can reasonably conclude that the evidence indicates a low-grade intelligence on the part of the parents and, therefore, that the children have an inheritance which is considerably below average. In addition to having low-grade inheritance, most of these children have been handicapped by living for several years during the most impressionable part of their lives in highly unfavorable surroundings.

In contrast to their very inferior inheritance the environment of foster children after their adoption is relatively superior. Whether, on the average, it is better than the environment of children in general is perhaps impossible to say. We can be reasonably sure that no very low-grade homes are included among the foster homes of these children. We can say, furthermore, that some very superior homes are included. In general, it is safe to say that the foster homes are much superior to the homes of the class of children to which they belonged before adoption.

The adoption of children of inferior inheritance into these relatively superior homes constitutes a kind of crude social experiment. In this experiment is accomplished the separation of the two factors of heredity and environment in such a way as to enable us to estimate the effect of the two factors separately. If heredity is the sole determining factor in intelligence these children should exhibit the same intelligence as other children of similar origin. If, however, the intelligence or the score on the intelligence test is susceptible of modification by the environment, then we should expect these children to stand higher than do other children of similar origin. The outcome of the comparison is decisive. The average intelligence quotient of 401 foster children was found to be 97.5. If the comparison is confined to the age groups which correspond to those used by Terman in setting his standard, the average of 285 cases is 98.5. In other words, the average intelligence quotient of these foster children is practically identical with that of children in general.

Besides comparing an entire group of foster children with children in general, we may make certain forms of analysis of the data so as to bring out the relationship between the home environment and the children's intelligence. If a superior home has an influence on the child's intelligence, we should expect that influence to vary with the degree of superiority of the home. Accordingly, the entire group of homes was divided into three according to the grade of the home, based on a home-rating scale. The entire group of foster children was also divided into the legitimate and the illegitimate groups in order to avoid any complications that might arise due to the difference between these two groups. The average intelligence quotient of the legitimate children in the good homes was 101 and in the poor homes 89. For the illegitimate group the average in the good homes was 109 and in the poor homes 96. The

difference in each case was about thirteen points, in favor of the good homes. Again, if the influence of the home is effective we should expect it to be more marked when children are adopted early than when they are adopted late. We accordingly divided the group into those adopted before five years of age and after five years of age. The average intelligence quotient of the group which had been committed early was approximately 96, and of the group committed later, 88, a difference of eight points.

In order to confine the comparison to children whose inheritance was similar, so as to reduce to the minimum any possible influence of variations in inheritance, comparisons were made between brothers and sisters. Among the entire group 125 pairs of brothers and sisters, or siblings, were found. These pairs were classified according to the grade of homes in which they were living, a member of each pair who was in the superior home being put in one group and the other member of the pair in the poorer home being put in the other group. The average IQ of those in the better homes was 95 and of their own brothers and sisters in the poorer homes 86, a difference of nine points. Again, a comparison was made of brothers and sisters placed early and those placed later. The average IQ of 129 who were placed at an earlier age was 94.3 and those placed at a later age 86.4. Finally, brothers and sisters who are placed in different homes were found to be less alike than are brothers and sisters who are brought up together. The degree of resemblance between brothers and sisters is usually expressed by a correlation coefficient of .50. In the case of brothers and sisters who are separated the resemblance is represented by a coefficient of only .34. Those in unlike homes, moreover, are less alike than those in like homes, the two coefficients being respectively .28 and .39.

The progress which these foster children make in school is another striking evidence of the favorable influence of a good home environment, in that their achievement is at least up to what one would expect from their intelligence scores. The percentage of the entire group who were accelerated in school was 11 and the percentage retarded 20. Both acceleration and retardation are less than is commonly found. If we confine the comparison to children who were placed in foster homes before they were six years of age and whose entire school career took place after their adoption, we find the percentage of acceleration to be 14 and of retardation only 11.

The study of twins gives us another angle from which to approach our problem. First consider the usual case in which twins are brought up together. Such twins are subjected to very much the same environment throughout the period of childhood and youth. Twins may now be divided into two groups according to the degree of their heredity or inborn resemblance. One of these groups consists of the so-called identical or monozygotic twins. These twins originate from a single ovum which divides and develops into two separate individuals. Each individual, then, is really identical with the other in respect to heredity, and the two individuals of an identical pair should be as much alike as are the two halves of the same person. Identical twins are always of the same sex. The second type, or fraternal twins, may be of the same sex or of the opposite sex. They develop from separate ova just as do brothers and sisters in general. The only difference is that they develop simultaneously instead of successively.

In a recently completed study of 100 pairs of twins, half being identical and half fraternal, but all pairs like sex pairs, confirmatory evidence of the distinction between the two types of twins was found. The differences in height and in weight

were tabulated for the identical twins and for the fraternal twins separately. Similar differences between pairs of siblings or brothers and sisters were then tabulated, taking, of course, only those of the same sex, and choosing measurements which were made at the same age. It was found that the curve representing differences for brothers and sisters is practically identical with that for fraternal twins and that both are radically different from the curve for identical twins.

One or two comparisons will serve to show the bearing of results of this study upon our problem. The first deals with the resemblance between identical and fraternal twins in physical traits and in mental traits. Take first a physical trait which is clearly not modified by the environment, namely, the finger ridges which make up the patterns on the fingers and which are recorded in finger prints. These remain the same throughout life and are an infallible means of identification. The correlation between the number of finger ridges on the hands of pairs of identical twins is practically perfect, which means that members of identical pairs have almost exactly the same number of finger ridges on their fingers. For fraternal twins, on the other hand, the correlation is somewhat under .50. Since this trait is determined entirely by heredity, then, we may say that .50 and 1.00 are measures of the degrees of resemblance between the two types of twins which are attributable to heredity. When we come to height and weight we find that the resemblance of identical twins is about as high as for finger ridges, but that the resemblance of fraternal twins is considerably higher than for finger ridges. This would seem to indicate that the resemblance in height and weight is influenced to some extent by similarity in the environment. When we come now to the scores on mental tests and to achievement as measured by the scores on achievement tests we find that the contrast between identical twins and fraternal twins becomes even less. This indicates that similarity in home environment, and other features of environment which go with this, have a still greater influence on the scores of intelligence tests and on general achievement tests than on physical traits like height and weight. Certain other traits which were tested, but which can not be described here, seem to be even less determined by heredity and more under the influence of environment.

To get at the problem more directly an attempt was made by a rather intricate method of statistical analysis to express the ratio between the influence of nature and nurture by a comparison of the differences between identical twins and fraternal twins. The assumption was made that the differences between identical twins are due to nurture, since they have identical heredity, and that the differences between fraternal twins are due to a combination of nurture and nature. The ratio of nurture to nature was found to be low in general in the physical traits and to be considerably higher in the mental traits. In intelligence and general achievement the ratio of the two factors appears to be about equal to unity.

The ideal type of case for the study of the relation between nature and nurture in twins is a pair of identical twins which has been separated at infancy and brought up under different circumstances. One such pair had been studied and reported previous to the present investigation. In this study, by Mueller, twin sisters were found to be similar in physical characteristics and in general intelligence, but different in some of the temperamental characteristics. Two of the three pairs of identical twins who were investigated in the Chicago study were brought up under rather widely dif-

ferent conditions. In one case one sister of an identical pair was brought up in London and the other in Canada. While the amount of formal schooling they had received was the same, the general intellectual stimulus to which they were subjected may have been different. At any rate, there was a difference of twelve points in IQ. There was also a noticeable difference in temperament. In the second pair, who were also identical sisters, there was a considerable difference in amount of schooling. One sister had gone through normal school, had taken training in music and had been a teacher for several years. The other had completed only the high school. There was a difference of twelve points in IQ in favor of the sister who had had the greater amount of schooling.

The third pair consisted of brothers who were also identified as identical. These brothers had had similar amount and kind of schooling and had engaged in similar occupations. One, however, had lived in somewhat larger towns than the other. Their intelligence score was almost the same, but they were of rather markedly different temperament. Three pairs, of course, do not give conclusive evidence, but the interpretations in these three cases are quite consistent with the view that their general intellectual ability and their temperament have been influenced to a noticeable degree by the circumstances in which they have lived.

If we grant that the evidence seems to indicate that intelligence may be influenced by the environment, how are we to explain the effect of environment on intelligence? How are we to think of intelligence and to conceive of its growth or development? It is difficult to conceive of intelligence as affected by education if we think of intelligence or of learning according to the atomistic theory. According to this theory learning consists merely in the formation of particularized responses to particularized elements of the surroundings. A complex form of learning would consist simply in a large collection of these particularized responses. It would be made up of a large number of special bonds between elements in the situation and elementary responses. If learning is thought of, on the other hand, as the organization of experience and the organization of suitable responses to the environment, it is quite possible that learning one thing helps the learning of another and that a cumulative effect may be produced which brings about a real improvement in intelligence.

What we call thinking is really such a process of organization. We learn to conceive of the features of our surroundings not as so many separate unrelated elements, but as grouped and organized in such a way that whole masses of them can be treated as units instead of as discrete elements. Thus in reading we learn to recognize a word not as merely a collection of letters, but as a unit having a definite meaning of its own. We proceed beyond this point and treat as units groups of words, sentences and even longer passages. This organization of the elements of our experience into organic units is what we call the formation of ideas. An idea may represent the organization of simple elements of experience into a larger unit. This idea may again become a unit in a larger organization. We carry on much of our thinking and much of our conversation in terms of these ideas. We do not go back to the original experience from which they are derived. The more ideas and the truer ideas a person has derived from his previous experience the better able he is to carry on the higher forms of organization which we call thinking. He is more intelligent because he is better able to deal with the problems that confront him, and this increase in intelligence is a product of his previous experience and his education.

Whether this explanation of the way in

which education may improve intelligence is correct or not, one practical point is clear. Whether education improves the intelligence will depend largely on whether the education is of a narrow specific sort or of the broader sort which encourages the development of ideas and generalizations. The kind of education we give the child, furthermore, will depend upon whether we believe in the possibility of the broader outcomes of education. This being the case it seems wise to give the child the benefit of the doubt and to provide for him the type of education which will develop his intelligence to the highest point of which he seems capable.

THE NATURE OF SPECIAL ABILITIES AND DISABILITIES[1]

By Dr. WALTER F. DEARBORN
PROFESSOR OF EDUCATION, HARVARD UNIVERSITY

SEVERAL years ago at a dinner of the Harvard Graduate School of Education, the late Professor Alexander Inglis and myself were among the after-dinner speakers. The occasion, as is usual, was one which admitted of such facetiousness and raillery as were at one's command. My turn came first and I took a good-humored fling at my distinguished colleague, the professor of secondary education, by referring to him as the secondary professor of education. To which challenge he came back with his accustomed vigor and alertness by referring to me as the feeble-minded professor of education. I must admit that this rejoinder struck home. My interests have more frequently been in the "off" rather than in the "on" side of things, in the debit rather than in the credit column of the accounts of individuals, and in choosing the title of my address for to-day, I confess that the inclusion of special abilities in my subject was somewhat by way of compensation. I have recently discovered something in regard to the nature of special disabilities. Trusting to the general law of the quantitative variation of individual differences, I shall make certain inferences in regard to the nature of special abilities, but I have but little first-hand information about them except as special abilities are sometimes associated with special disabilities in the same individual.

My acquaintance with the problem comes from a study of the extreme difficulties which some children have in learning to read. An analysis of these difficulties in reading and in learning to read furnishes the factual basis of this discussion. In reviewing in 1924[2] the observations and findings in regard to twenty-five such cases which had come to my attention, I made note of the association of differences in handedness and in the following year[3] of what has since become known as "eyedness" with these disabilities. The most commonly observed errors in these cases were the reversals of the forms of indi-

[1] An address delivered before the Harvard Teachers' Association at its thirty-ninth annual meeting in Cambridge on March 29, 1930.

[2] "Special Disability in Learning to Read," an address at the Eleventh Annual Conference on Educational Measurements, held at Indiana University on April 18 and 19, 1924, and published by the School of Education of Indiana University in 1925.

[3] Elizabeth E. Lord, Leonard Carmichael and Walter F. Dearborn, "Special Disabilities in Learning to Read and Write," Harvard Monographs in Education, No. 7, June, 1925. See also a chapter on "Special Abilities and Disabilities" in the writer's "Intelligence Tests, Their Significance for School and Society," Houghton Mifflin Company, 1928.

vidual letters as in reading "dig" for "big" or "pig," and in reversing the order or sequence of letters as in reading "saw" for "was," "on" for "no," "tog" for "got," "place" for "palace." In tachistoscopic reading the tendency to tackle words from the wrong end was definitely observed, and a similar tendency could also be made out from the photographic records of the eye-movements in the reading of some of these children. Partially or completely mirrored writing was also present in some instances. It seemed likely that these mistakes were due to the interference of sinistral tendencies of hand and eye with the learning of the dextrad movements and sequences required in our reading and writing.

Finally the publication of Parson's work on left-handedness[4] in 1924 disclosed the phenomenon of unilateral sighting in binocular vision and definitely raised the question of the relationship between the dominant eye and the favored hand. To make a long story short, I shall cite a statement on the "Etiology of Reading Disability," which I have previously prepared for use in advising parents and teachers in regard to the nature of these difficulties in reading and writing.

The disability springs from such simple origins that it seems unreasonable that it should be so pervasive in its effects, but it is a form of what in severer degrees has been called word-blindness. Our present analysis of the difficulty is briefly along the following lines.

It appears that in the development of speech and writing one of the cerebral hemispheres is primarily concerned or dominant in the coordinations or associations made. It has long been held that in the case of right-handed individuals, it is the left hemisphere and in left-handed the right hemisphere. This implies a lateral dominance of one side of the body which may be best described objectively in terms of the relative valence of hand and eye, the two organs primarily concerned in (silent) reading and writing. To put the matter in a nutshell, it appears that in order to avoid difficulties in reading and writing one should be either left-eyed and left-handed, or right-eyed and right-handed, and preferably the latter. Difficulties appear especially in children who have been "changed over" in handedness or whose "one-sidedness" or lateral dominance has never been well established. The reason for this situation seems to be about as follows.

In writing and reading (in our language) the movements of the hand and eye are dextrad. It is this sequence from left to right which has to be followed to build up the correct visual and kinesthetic images of words. This is the natural and easiest movement of the right-handed—away from the center of the body. Left-handed and left-eyed children have a preference for the other direction, *i.e.*, sinistrad. The opposite or dextrad direction is so awkward for them that at the start they appear to "push" the pencil in writing. Some of them even write a mirrored hand, and in reading confuse the reversible letters "b" and "d," etc., or reverse the sequence of letters, as in reading "god" for "dog" or "on" for "no." Difficulties in reading may develop on this basis alone, but they are usually more obvious, since in the letter reversals and mirror writing they are more readily checked by the teacher. When lateral dominance has not been established, the trouble is more insidious and subtle and not so easily detected. There is uncertainty about the correct sequence of letters in words because of conflicting tendencies of hand and eye. The result is that faulty word images with letters interchanged are stored up in the mind which later make the prompt and precise recognition of words difficult or

[4] B. S. Parson, "Lefthandedness," New York, 1924.

almost impossible. This difficulty in establishing the correct sequence in the visual field is sometimes associated with a similar confusion in the ordering of vowel and consonant sounds, and causes stuttering. Characteristic misreadings in these later cases are as follows: "soft" for "spot," "licks" for "likes," "cool" for "cold," "migit" for "might," "broad" for "board," "framing" for "farming," "scratching" for "scarcely," "victoral" for "victrola," "signature" for "structure," etc.

This thesis appears to be substantiated by the examination of a continuing series of cases now numbering in the neighborhood of one hundred. Its proof must await the results of a projected statistical study of the relations of ocular and manual dominance in an unselected school population, and the correlation of these findings with established degrees of reading disability. In support of the last statement and as contributing evidence to the thesis of this paper the recent investigation of Oates[5] along these lines as to the relation of handedness and eyedness to speech defects may be cited. He found the highest percentage of speech defects among the mixed types or "crossed sinistrals" where the lateral dominance of hand and eye had not been established on the same side or had been interfered with and weakened.

There is time to cite but a single example of a special disability, and the example I have chosen will seem to suggest one way in which special abilities may originate, namely, as a compensation for a special disability. The boy in question was referred to by his head master as "an extremely nice boy, with artistic interests, very much liked by the boys and the masters, but curiously dull at his books in comparison with his social intelligence." The impression which one got, from talking with him and observing him, of his general intellectual competence, his social bearing and his artistic interests and skills were, in a word, in evident contrast with his scholastic failures.

In the Stanford Binet Intelligence examination he secured a mental age of sixteen years and three months and an intelligence quotient of 102. This is an average record but, as noted above, not in keeping with the general impression he makes. He had impressed me as a boy of parts. An examination of the record showed that his failures were chiefly in the linguistic tests, that the visual recognition of words was especially defective, that he got ideas better orally and finally that he passed all the tests, up through the eighteenth year level, of practical ingenuity. In my own general intelligence examination, which he had taken at school, he had secured a somewhat better rating, an intelligence quotient of 110—because the test is not as highly verbal as the Binet and most other tests in common use. Then in a series of tests of accomplishment in the ordinary school subjects which I gave him, although he reached on the average the ninth grade level, he made an exceptionally high record, equaling that of twelfth grade pupils, in a test of nature study and science, whereas in an exercise in dictation or spelling he did no better than seventh grade pupils.

These findings suggested that he has been suffering from a special linguistic disability, which has handicapped him in his schooling. This surmise I was able to support in the second examination by the following observations.

(1) In the first place it was noted that in reading words and phrases which were shown to him only for a brief interval (in the tachistoscope) he had a narrow visual span and that his recognition of words was

[5] David W. Oates, "Left-handedness in Relation to Speech Defects, Intelligence and Achievement," *The Forum of Education*, 7: 91–105, 1929.

uncertain. For example, he read "in a shay" as "in the hay," and "once there was" as "on their way." This indicates that his visual images or memories of word form are vague and ill-defined.

(2) This deficiency is apparent also in his spelling from dictation, and he attempts to compensate for it by efforts at spelling phonetically. Some examples of his misspellings are "pleage" for "pledge," "dangeous" for "dangerous," "chone" for "shown," "secratery" for "secretary," "colified" for "qualified," "finachial" for "financial," "cusoonary" for "customary," "notorichy" for "notoriously," "evishent" for "efficient," "fatige" for "fatigue," "pietyable" for "pitiable," "distrot" for "distraught."

(3) In the next place, it was noted that in reading aloud a passage of rather long and difficult words he became confused and stuttered somewhat. Stuttering is occasionally associated with the condition exposed by the following laboratory tests.

(4) Finally, our tests show that he is left-eyed, that is, that the left eye is the dominant, "master" or "sighting" eye; it is the "team" horse; that, although he writes with his right hand, he does some acts of skill with his left hand, *e.g.*, he deals cards with his left hand, and in tests in which he is not practiced he is either left-handed (as he said in connection with one of the tests, "It seemed more natural to do it that way") or ambidextrous. These findings undoubtedly indicate the cause of his disability.

To this curious and fortunately rare quirk in his mental machinery, I am inclined to attribute his scholastic difficulties and his low rating in the intelligence tests, and to think that his artistic skills and interests are the direct outcome of an able and intelligent mind in its efforts to establish its competence in other directions. The extent to which such "compensations" (if this designation is correct) appear in the records of these non-readers is at any rate striking. More usually in the case of boys it follows along mechanical lines; in fact, so frequently are unusual skills in these directions encountered that in establishing the diagnosis one is apt to inquire whether the boy is mechanically inclined.

My thesis is not that in order to have special abilities one must have special disabilities, although I believe that there are such cases, but that as special disabilities may arise through the faulty functioning of perfectly good sensory and motor equipment, so special abilities may arise through facilitation in the operation of just such standard equipment, when there is also present high intelligence, interest and the urge to succeed and to excel. There may also be high acuities or sensitivities and dexterities associated with special abilities, but their existence has not been established. At any rate, excellence of sensory equipment does not guarantee accomplishment, although its lack may handicap. When Woodworth writes, "If there is any other fact to be observed in a distant view of genius, it is perhaps a remarkable keenness of perception in the field peculiar to any individual genius,"[6] it is fair to remark that it is not clear in how far the keenness is sensory and native or in how far it is acquired.

A perusal of the all too scanty literature of special abilities lends support to this view. Mitchell[7] in his study of mathematical genius writes of himself that high achievement is due to the preoccupation with figures in the absence of other playthings or playmates.

A recent experience of mine is illuminating from this angle. While I was recently examining a little girl of nine, an inter-

[6] R. S. Woodworth, "Dynamic Psychology," p. 131.

[7] Frank D. Mitchell, "Mathematical Genius," *American Journal of Psychology*, 18: 61–143.

ested mother handed me this comment: "It might be helpful to you to know that she counts everything, the designs on rugs, the ruffles in a lady's dress in the movies, the divisions of a grapefruit, etc., etc." It was helpful. It may help to explain why she passed the code test of the sixteenth or adult level on the Stanford Binet tests and almost passed the auditory memory span test for digits of the superior adult level. She was suffering from the specific type of reading disability above described, but was possessed of a fine competent mind (despite her handicap she secured an intelligence quotient of 126 on the Stanford Binet Test) which very well may have said to itself, "Well if I can't read, I can and will count." Perhaps the extraordinary accomplishments described in the literature of eidetic imagery may be similarly due to a chance interest and a subsequent preoccupation in the absence of rivaling interests. Studies such as those of DeVoss[8] and Foran[9] agree that there is no greater unevenness of specialization of abilities in gifted than in dull children, that the gifted children are simply more successful specialists. And finally, as Hollingworth remarks in an excellent chapter on arithmetic in her book on "Special Talents and Defects,"[10] "The rôle played by practice is seen in the fact that if interest in counting wanes and practice at calculation ceases, the skill acquired deteriorates through disuse. Whatley, and others, who became distracted from calculation by other interests, as they grew up, lost the power they had possessed." There are other aspects of the matter which are illuminating, but those referred to are perhaps sufficient to show that there is something to be said for the above thesis.

EDUCATIONAL EVENTS

THE AMERICAN DORMITORY IN THE UNIVERSITY CITY AT PARIS

The Associated Press reports that the American dormitory of the new "University City" in Paris was dedicated on April 28 in the presence of the French President, Gaston Doumergue; Pierre Marraud, Minister of Public Instruction; André François-Poncet, Minister of Fine Arts; Paul Reynaud, Minister of Finances; Dr. S. Charlety, rector of the University of Paris, and other notables.

Mr. Walter E. Edge, American ambassador, was the principal speaker. Other speakers were Dr. Charlety, M. Marraud and André Honnorat, former Minister of Education. All stressed the value to international good will of international contact among youth.

According to the Associated Press, the "Cité Universitaire" student settlement, though only two years old, is becoming the new Latin Quarter of Paris. Artists are following the students, and a new Bohemian center appears to be in the making.

A donation by the French philanthropist, Emile Deutsch de la Meurthe, who desired to establish dormitories, restaurants and the like for French students on the site of the old fortified wall of Paris, started the project.

From his idea grew a scheme to build dormitories for students of all nationalities attending the University of Paris. The American building, which cost $400,000, is the eighth built for foreign students. It will house 275 students of both sexes, for from $2 to $5 a week, with ample accommodations for sports and other student activities.

The honor of opening the ceremonies was given Dr. Homer Gage, who was credited with the most active part in collecting money for the building. He obtained $75,000 in the United States.

John R. Bacher, an instructor in the depart-

[8] See Terman *et al.*, "Genetic Studies of Genius," Vol. 1, Chapter XII.

[9] T. G. Foran *et al.*, "A Study of Trait Variability," Catholic Univ. Research Bulletin, Vol. 3, No. 6, 1928. See also C. L. Hull, *J. of Ed. Psych.*, 18: 97–106, and E. Woodyard, Teachers Col. Pub., Columbia University, 1926.

[10] Leta S. Ho[illegible] 923.

ment of history at the University of Pennsylvania, has been chosen director of the dormitory and will take over his new work as soon as installation of the fixtures and furnishings is completed this summer. The new director is a Rhodes scholar, and his wife, Marie-Emma Bourdin Bacher, is a French woman who was formerly an instructor of French at Swarthmore College.

The model campus of the University of Paris represents the first attempt of the Sorbonne and allied colleges to provide campus facilities and centralized student dormitories. It covers a large acreage just outside the gates of Paris, where eventually dormitories for students from Canada, Belgium, England, Japan and the Argentine will stand, with eight French buildings near by. Some of the foreign buildings are already erected.

Ambassador Edge, in formally declaring the house open, said it seemed particularly fitting that the American democracy, which bases its force on education, should have an intellectual embassy at the very crest of Mount St. Genevieve, which for more than six centuries has been one of the highest peaks of world culture. He emphasized that the house is a monument to intellectual exchange among nations, adding that during his recent tour of French industrial centers he had been struck by the rôle which French universities play in the life of the community. "The student city of which this house is a part will contribute to the fellowship of nations," he continued. "I am convinced that the student city will contribute profoundly to the peace of generations to come, and that this American house will do more than its full share in bringing about a deeper and more profound understanding between peoples."

THE SUPREME COURT ON FREE SCHOOL BOOKS

IT is stated in the *U. S. Daily* that statutes of Louisiana providing for the purchase of school books to be supplied to the school children of the state free of cost were held valid by the Supreme Court of the United States on April 28.

The Supreme Court of Louisiana had affirmed a judgment of the trial court refusing to issue an injunction to restrain the use of tax proceeds for such purpose in a suit by citizens and taxpayers of the state, and the citizens and taxpayers appealed upon the ground that the statutes violated the provisions of the federal constitution guaranteeing to each state a republican form of government and also the fourteenth amendment, which was invoked on the theory that taxation for the purchase of school books constituted a taking of private property for private purposes, in that the private, religious, sectarian and other schools, not embraced in the public educational system of the state, are benefited by the furnishing of textbooks free to children attending such schools.

The Supreme Court held that the contention was untenable. Viewing the statutes as legislation for the benefit of the school children and not for the benefit of the schools, in accordance with the view taken by the State Supreme Court, it was held that the taxing power of the state is exerted for a public purpose.

Chief Justice Hughes delivered the opinion of the court, which in part reads:

> One may scan the acts in vain to ascertain where any money is appropriated for the purchase of school books for the use of any church, private, sectarian or even public school. The appropriations were made for the specific purpose of purchasing school books for the use of the school children of the state, free of cost to them. It was for their benefit and the resulting benefit to the state that the appropriations were made. True, these children attend some school, public or private, the latter, sectarian or non-sectarian, and that the books are to be furnished them for their use, free of cost, whichever they attend. The schools, however, are not the beneficiaries of these appropriations. They obtain nothing from them, nor are they relieved of a single obligation because of them. The school children and the state alone are the beneficiaries. It is also true that the sectarian schools, which some of the children attend, instruct their pupils in religion, and books are used for that purpose, but one may search diligently the acts, though without result, in an effort to find anything to the effect that it is the purpose of the state to furnish religious books for the use of such children. . . . What the statutes contemplate is that the same books that are furnished children attending public schools shall be furnished children attending private schools. This is the only practical way of interpreting and executing the stat-

utes, and this is what the State Board of Education is doing. Among these books, naturally, none is to be expected adapted to religious instruction.

COOPERATIVE EDUCATION AT CLEVELAND

THE first products of Cleveland's experiment with cooperative education will receive the degree of bachelor of science this spring. They are the first graduates of the day school of engineering at Fenn College of the Young Men's Christian Association School of Technology.

Three other schools in Ohio—the University of Cincinnati, Akron University and Antioch College—are operating under the plan of alternating periods in employment and class room. Fenn College is the first and so far the only undergraduate school in Cleveland to adopt the cooperative program. In the autumn a day cooperative division will be started in the department of business administration. The last two years of the preparatory school have been cooperative in practice for the past year.

Since the program was started five years ago in the engineering department, the number of students has increased from 14 to 300 in the day college, and the number of cooperating firms employing students from 6 to 70.

The ten graduates include six electrical engineers, three structural engineers and one mechanical engineer, all receiving the bachelor of science degree. All will obtain good jobs after graduation, some with the concerns for which they have been working during their five years of training. They have alternated five weeks in the class room and laboratories with five weeks in the mills and industrial concerns.

Dr. C. V. Thomas is director of the Young Men's Christian Association School of Technology, Dr. J. C. Nichols, graduate of Massachusetts Institute of Technology, the dean of the engineering department. A department of coordination places the student in employment, arranging for a variety of experiences in the various departments of work related to their engineering fields.

While students are paid regular wages for their industrial work, the plan was not adopted for its financial advantages, but for the purpose of relating actual life experience to the process of learning, giving the students opportunity to apply, fix and evaluate text-book theories.

Seven laboratories and a surveying period at summer camp are among the school's facilities, with a full-time faculty of twenty-seven. Applicants must have graduated in the upper or middle third of their high-school classes.

Employers, including the American Steel and Wire Company, and the Ohio Bell Telephone Company, are enthusiastic about the plan. Educators in the city are watching it with interest, both Dr. W. E. Wickenden, the new president of Case School of Applied Science, and Dr. A. Caswell Ellis, director of Cleveland College, having congratulated the college on the success of its first five years.

THE EXPOSITION AND FESTIVAL AT SYRACUSE UNIVERSITY

THOMAS E. FINEGAN, formerly commissioner of education of the State of Pennsylvania and assistant commissioner of the New York State Education Department, and at present educational director of the Eastman Kodak Company Film Service at Rochester, addressed teachers and principals of secondary schools in New York State at a general session at Syracuse University on May 3 in connection with the Educational Exposition, which took place on the campus on Thursday, Friday and Saturday.

Several hundred high-school teachers attended the meeting, which was arranged under the direction of Dean Harry S. Ganders, of Teachers College, Syracuse University. Following the general session, there were several group meetings in the various departmental headquarters about the campus to discuss problems of particular interest to teachers in special fields.

The University Exposition, said to be the first of its kind ever attempted in the United States on such a large scale, included a varied program which depicted the activities and accomplishments of each of the seventeen colleges and schools of Syracuse University.

Two-year-old spruce trees, potted and ready for transplanting, were given to those visiting the exhibition arranged by the New York State College of Forestry. The entire forestry building was devoted to a demonstration of modern methods of reforestation and of utilization of wood products.

The Kem-Sho, forerunner of the University Exposition, arranged by the department of chemistry, was in continuous operation during

the three days of the exposition, as was a similar show staged by the department of physics. The formal opening of the new Museum of Natural Science coincided with the exposition. Here all the natural science departments exhibited collections illustrating the nature of their work, and here also was an aquarium, containing 675 gallons of water and specimens of all New York State fish.

The first night of the exposition featured the annual concert of the Syracuse University Chorus, which sang Bach's "God's Time is the Best" and Hadley's "The New Earth," under the direction of Dr. Howard Lyman. On Friday afternoon the regional finals of an intercollegiate oratorical contest on "The Constitution" took place, with representatives from Union, Niagara, Cornell, Houghton, Elmira, Colgate, Canisius and Syracuse participating. The annual graduating recital of the School of Speech was held on the evening of the second day.

The annual moving-up-day exercises, the women's day program, which took the form of an Elizabethan garden party, a track meet between Syracuse and Dartmouth and a symphony concert under the direction of Professor André Polah, of the faculty of the College of Fine Arts, were on the final day of the exposition, in addition to the teachers' meetings and the continuous exhibitions in the gymnasium and the college buildings.

MEETING OF NEW YORK ELEMENTARY-SCHOOL PRINCIPALS

COMPRISING one phase of a newly organized state program of pre-service and in-service training for elementary-school principals, the first annual Conference for Elementary-school Principals was held at the State Teachers College at Buffalo on April 11 and 12.

This development is a part of the general advance in elementary education in New York State under the leadership of Dr. J. Cayce Morrison, assistant commissioner for elementary education. In the formulation of the standards for training and certification, Dr. Morrison has had for the past two years the active cooperation of elementary-school principals and of the New York State Council of City and Village Superintendents. The latter organization adopted at Lake Placid last October the report of its own committee upon standards for preparation and certification of elementary-school principals. According to the provisions of this report, it is proposed that the New York State Department of Education shall eventually issue a special certificate for elementary-school principals, the requirements for which will include the completion of a program of approved professional courses as well as successful teaching experience. It is expected that at least one year in addition to the three years now required for the permanent certification of elementary-school teachers will be required to satisfy the requirements recommended by the report of the superintendents' committee.

The State Teachers College at Buffalo has been designated by the State Department as the initial center for the establishment of the training program, and Worth McClure, formerly assistant superintendent of schools in Seattle, was appointed professor of elementary-school administration. During the current year Mr. McClure has been offering both intra-mural and extension courses for principals and assisting in the organization of the four-year sequence of courses leading to the elementary-school principals' certificate.

The recent principals' conference was planned under the direction of Mr. McClure as the first of a series of annual events in which it is hoped that those who are in pre-service training may be brought into contact with administrators from the field who are interested in elementary-school problems. Wide-spread interest in the work is evidenced by the fact that approximately two hundred principals and superintendents from all parts of the state were in attendance.

THE MINNESOTA CONFERENCE ON TEACHER TRAINING PROBLEMS

ONE of the features of the Schoolmen's Week activities, held from April 14 to 18 at the University of Minnesota, was an invitational conference on problems of the education of teachers, which was held on April 17 at the Minneapolis Club in that city. In addition to representatives of all teachers colleges, the College of St. Thomas, Hamline University, Carleton College, the State Department of Education

and the University of Minnesota within the state, representatives were present from institutions interested in teacher training from neighboring states. Among participants from outside the state were Professors William C. Bagley, Teachers College, Columbia University; Chas. H. Judd, director of the School of Education, University of Chicago; M. G. Neale, dean of the School of Education, University of Missouri; Dr. Paul Dengler, director, Austro-American Institute, Vienna; President E. C. Higbee, State Teachers College, Madison, South Dakota; Professors J. V. Breitwieser, dean of the School of Education of the University of North Dakota, and Willard C. Olson, of the School of Education of the University of Michigan; Robert D. Baldwin, president of the Central State Teachers College, Stevens Point, Wisconsin; Silas Evans, president of Ripon College; Burton E. Nelson, president of the Stout Institute; Eric Selke, of the State Teachers College, Marysville, South Dakota, and F. Von Borgensrode, of the School of Education, University of Missouri.

No papers were read, but following an informal luncheon, those present took part in a spontaneous discussion of some of the major problems of policy and practice that are said to have been of unusual significance. Problems receiving the most attention were those associated with the organization of subject-matter content and its relation to professional training, the five-year curriculum for high-school teachers and the desirability of some means of coordination of the efforts of the many organizations, societies and other organized agencies furnishing or definitely influencing the training of teachers. President L. D. Coffman and Dean M. E. Haggerty, of the university, presided.

A motion requesting the continuance of the conference as an annual event was passed by acclamation.

THE NATIONAL EDUCATION ASSOCIATION AT COLUMBUS

The sixty-eighth annual convention of the National Education Association will be held in Columbus, Ohio, from Saturday, June 28, to Friday, July 4. The geographical location of the convention city offers the possibility of a record attendance. Convention arrangements in Columbus are said to be excellent. Many conventions are held in Columbus and hotel managers have learned to handle large numbers of guests with convenience and comfort. Sectional meeting places are conveniently located with reference to a modern auditorium large enough to meet the needs of the large membership. The auditorium is only three blocks from the two largest hotels. The hospitality shown at the Atlanta meeting last summer has inspired the teachers of the State of Ohio to make plans for the heartiest welcome. The city of Columbus has been preparing for this meeting since last summer.

The president, Miss E. Ruth Pyrtle, principal of the Bancroft School in Lincoln, Nebraska, hopes that it will be the most successful summer meeting the association has ever held. Arrangements at Columbus include a pageant which will be presented by college students in Ohio and will be built around the history of the Northwest Territory and Ohio. A special feature of the extra-session activities will be the second life-membership dinner, which more than 500 life members are expected to attend. The association will observe the Fourth of July with a flag drill by 10,000 children of the Columbus schools. Special music, vocal and instrumental, will be provided by the public schools of Columbus and other Ohio cities. Columbus entertainment plans include a sight-seeing drive through the city, and a reception by Governor Myers Y. Cooper.

The theme of the convention is "Vital Values in Education." Emphasis will be placed upon the international point of view, the art of living and creative living.

The Housing Committee for the Columbus meeting of the National Education Association is prepared to give thorough service to members of the association. Those who arrive in Columbus without hotel reservations will be cared for, but it is very desirable that advance reservations be made. Requests for hotel accommodations should be forwarded to Mr. George M. Troutman, Chamber of Commerce, 30 East Broad Street, Columbus, Ohio. Members are requested to state their requirements exactly, giving the number of rooms wanted, names of persons for whom required, price per day that they wish to

pay and the dates of arrival and departure. They will be advised promptly of the name and location of the hotel in which the assignment is made, and the hour at which the room is available.

Special convention railroad rates will be available. The reduced rate will be obtainable as usual by the use of the railroad certificate which will be supplied to members on request by Secretary J. W. Crabtree, 1201 Sixteenth Street, N. W., Washington, D. C. These convention rates, with the summer excursion rates, will provide economical railroad transportation costs. Columbus is well served by bus lines, and is the center of a net-work of through highways which invite travel by automobiles.

EDUCATIONAL NOTES AND NEWS

PROFESSOR JOHN DEWEY, whose retirement as professor of philosophy at Columbia University was announced recently, has been appointed professor emeritus of philosophy, in residence, from July 30.

A SPECIAL convocation was held at Birmingham-Southern College on April 29 when the address was given by Dr. William John Cooper, United States commissioner of education. Dr. Cooper was awarded the honorary degree of doctor of laws.

DR. JOSEPH S. AMES, president of the Johns Hopkins University, was the guest of honor at the recent annual dinner of the New York Alumni Association.

THE University of Marburg has conferred upon Professor William Walker Rockwell, librarian of the Union Theological Seminary, the honorary degree of doctor of theology.

DR. ROBERT FRANCIS SEYBOLT, professor of the history of education in the University of Illinois, has been elected a member of the American Antiquarian Society.

THE gold medal of the National Institute of Social Sciences has been awarded to Miss Anna B. Gallup for her distinguished service of more than a quarter of a century as curator-in-chief of the Children's Museum of Brooklyn.

DR. WILLIAM WIRT KING, president of Ozark Wesleyan College at Carthage, Missouri, since 1924, has been compelled to resign his office because of ill health.

PRESIDENT FRANK MACDANIEL has presented his resignation to the trustees of Genesee Wesleyan Seminary to become effective on July 1. He went to the school in 1922.

DR. OLIN SILAS LUTES, since 1926 head of the department of education at the University of Maine, has been appointed dean of the recently instituted School of Education.

GILBERT STEWART WILLEY, superintendent of schools in Trinidad, Colorado, has been appointed professor of education at the University of Denver, effective on September 1, when Professor R. J. Walters, at present head of the department, becomes dean of the College of Liberal Arts.

WESLEYAN UNIVERSITY announces the appointment of Dr. Harold E. Israel as Frank B. Weeks visiting associate professor of psychology for the first semester of 1930–31.

DR. ARTHUR E. CASE, of Yale University, has been appointed professor of English at Northwestern University to succeed the late Professor Frederick J. Kaye.

THE following appointments have been announced at Iowa State College: J. W. Woodrow, professor of physics at the college, head of the department of physics; Frank D. C. Vilbrandt, professor of chemical engineering at the University of North Carolina, professor of chemical engineering; Pearl P. Swanson, of Yale University, associate professor of foods and nutrition; William B. Sarles, of the University of Wisconsin, assistant professor of dairy industry.

DR. MILTON J. FERGUSON, state librarian of California, has been elected chief librarian of the Brooklyn, N. Y., Public Library.

PROFESSOR J. F. WHITFORD, head of the department of education at Milton College, Wisconsin, for the last seven years, has resigned to become head of a new consolidated school system at Bolivar, New York. Mr. Whitford was formerly principal of the Milton High

School. In 1926 he organized the department of college professors of education of the Wisconsin Teachers Association and was its first chairman.

SUPERINTENDENT F. M. LONGANECKER has been reelected by the Board of Education of Racine, Wisconsin, for a period of three years at a salary, respectively, of $6,500, $7,000 and $7,500.

PROFESSOR M. V. O'SHEA, head of the department of education of the University of Wisconsin, has been chosen honorary president for America of the International Congress on Home Education, to be held in Liége, Belgium, early in August.

DR. R. E. BLACKWELL, president of Randolph-Macon College, has been reelected president of the Virginia Commission on Inter-Racial Cooperation.

MRS. CHARLES GILKEY, of Chicago, has been elected national president of Girl Scouts.

AT the annual meeting of the Association of Colleges of Alabama, held recently in Birmingham, Dean Gilbert Wilcox Mead, of Birmingham-Southern College, was elected president for the year 1930–31. Other officers include President H. J. Willingham, of Florence State Teachers College, *vice-president*, and Registrar B. L. Shi, of the Alabama Polytechnic Institute, *secretary-treasurer*.

A PRESS report from Chicago states that the Honorable W. L. McKenzie King, premier of Canada; Mr. Gerard Swope, president of the General Electric Company, are among the former residents of Hull House Settlement in Chicago who plan to return to honor Miss Jane Addams at the fortieth anniversary of the founding of Settlement House.

DR. ARNOLD GESELL, director of the Yale Psycho-Clinic, delivered the annual Susan E. Blow memorial lecture before the New York Kindergarten Association on May 2.

DR. AUGUSTUS O. THOMAS, formerly Maine commissioner of education and president of the World Federation of Education Associations, will give two courses at the summer school of the University of New Hampshire in July. One course will be on international relations, the other on education.

DR. JOHN LIVINGSTON LOWES will be the next incumbent of the Francis Lee Higginson professorship of English literature at Harvard University, and Dr. Ralph Barton Perry will become the first holder of the Edgar Pierce professorship of philosophy, beginning on September 1. In the theological school Dr. Johannes A. C. F. Auer has been appointed Parkman professor of theology as well as professor of church history, and Dr. Arthur Darby Nock becomes Frothingham professor of the history of religion.

PROFESSOR GEORGE H. NETTLETON, chairman of the English department of Yale University, has been appointed Hyde Foundation lecturer to the French provincial universities for the year 1930–31. This lectureship, established in 1904, aims to strengthen understanding and accord between French and American universities. The American visiting professor is appointed annually to lecture at the sixteen officially recognized French universities outside Paris, and may be chosen from any field of scholarship. The earliest appointees—Professors Barrett Wendell, George Santayana and Archibald Cary Coolidge—and many later ones, were from the Harvard faculty, but the list has included Professors Henry and Paul van Dyke, of Princeton; Dr. John H. Finley, Professor H. C. Lancaster, of the Johns Hopkins, and others. The present lecturer, 1929–30, is Professor Walter B. Cannon, of Harvard. Professor Nettleton is the first appointee from the Yale faculty, though Professor George P. Baker, while at Harvard, held the lectureship.

DR. FREDERICK P. KEPPEL, president of the Carnegie Corporation, spoke at the University of Virginia on May 5, 6 and 7 as lecturer on the Page-Barbour Foundation. His subject was "The Foundation: Its Place in American Life." Among those who have lectured at the University of Virginia on the Page-Barbour Foundation are S. Weir Mitchell, Basil L. Gildersleeve, Charles W. Eliot, Thomas R. Lounsbury, William H. Welch, James Bryce, Arthur T. Hadley, William Howard Taft, Archibald Cary Coolidge, William Roscoe Thayer, John T. Finley, James T. Shotwell and A. N. Whitehead.

THE North Central Association of Colleges and Secondary Schools, meeting in Chicago, has

voted to exclude Butler University, Indianapolis, from the association on the grounds that its large athletic plant was financed by local business men, and because of the inadequacy of its library, the insufficient number and low salaries of professors and instructors.

THE text-book on "Modern History" by Professor Carlton J. H. Hayes and Associate Professor Parker T. Moon, of Columbia University, which has been used in the schools of New York City for the past seven years, has been dropped from the eligible list by the Board of Superintendents. This action followed criticism by an Episcopalian rector to the effect that the book is anti-patriotic, radical and pro-Catholic. Professor Hayes is said to have learned of the decision only when teachers reported that their requisitions for the book had been denied. Inquiry by the Macmillan Company, which has sold more than 150,000 copies of this history, received the following reply: "In view of the fact there was this criticism and of the further fact that we had a sufficient number of textbooks on modern European history on our lists, it was decided the best interests of the school would be served by removing the Hayes and Moon 'Modern History.'"

CENTRE COLLEGE, Georgetown College, Kentucky Wesleyan College and Transylvania College, all located in the blue grass region of central Kentucky, have decided to hold joint meetings of their faculties four times each college year. The first meeting was held on February 15, at Transylvania College in Lexington, and was attended by more than seventy-five faculty members of the four institutions. The colleges each represent different denominations, Presbyterian, Baptist, Methodist and Disciples of Christ. This joint meeting of the four faculties expresses a new recognition of the common objectives and problems of the small college. The plan of the joint meeting contemplates a brief opening session followed by a division into nine discussion groups as follows: English language and literature, foreign languages, social sciences, physical sciences and mathematics, religion, Bible and philosophy, psychology and education, physical education, fine arts, administration. At the close of the group meetings, the joint faculties reassemble for a business session. The purpose of the entire plan is to stimulate greater intellectual activity on the part of students and faculties, and the experience of the first meeting was such that the four colleges concerned determined to continue the plan. The next meeting will be held at Centre College in Danville on May 10.

A RECENTLY organized Society for Occupational Research, working in cooperation with the committee on guidance and placement of the 122 Kiwanis Clubs of the California-Nevada District, has established headquarters, including conference rooms and a library, on the campus of the University of Southern California. The "Bennett Plan," named for Dr. G. Vernon Bennett, of the school of education of the university, who founded the society, has been adopted for vocational guidance. Beginning with the junior high school, the plan provides for occupational exploration for students covering a period of three years, with a period of counseling, training and placement covering four or five years, including senior high school and junior college. According to the society, it takes at least three years for a boy to explore the twenty-four occupational possibilities which he should examine before making a final occupational choice. Methods of examination include (1) hearing a teacher describe the range of possibilities within an "occupational family," (2) demonstration and dramatization of type activities, (3) motion pictures of all phases of the occupation, (4) visits to factories, stores, offices, court-houses, hospitals, etc., (5) participation in selected activities in school, shop or office. E. T. Robinson is president of the Society for Occupational Research; twenty-nine educators comprise its present membership.

THE first annual awards of fellowships to southern graduate students in the social sciences, made possible by a grant of $50,000 from the Julius Rosenwald Fund, have been announced by the Social Science Research Council. Out of 125 applicants, representing practically all the states of the South, twenty-six were chosen. Ten of the new fellows are women and sixteen are men. Five are Negroes. All were chosen on a competitive basis, and will spend the next academic year at some accredited graduate school working on social science

problems of special interest to the South. The major purpose behind these new fellowships is to attract a higher quality of scientifically trained personnel to work on important social problems facing the Southern section of the country, according to the announcement of the Southern Fellowships Committee, of which W. W. Alexander, of Atlanta, Georgia, is chairman. The fields represented by the fellowships include sociology, economics, government, history, psychology and social work. It is hoped that one of the important by-products of this new series of fellowships will be to build up a more enlightened social and economic leadership in the South.

A PRINCETON distinguished service award in the form of an annual prize of $1,000 has been established by the class of 1912. Beginning at its twentieth reunion in 1932 the class will present the award each year "to the class whose members either individually or as a whole during that year shall have worthily exemplified the ideals for which Princeton University stands in the field of intellectual, spiritual or mental endeavor." The award is to be spent "in the best interests of Princeton University" by the class winning it.

A GIFT of $30,000 has been made by Mr. Edward S. Harkness for the support of the department of the diseases of children in the College of Physicians and Surgeons of Columbia University. Dr. Rustin McIntosh has been appointed professor of diseases of children.

A RESOLUTION asking the New York State legislature to amend the city charter to permit the issuance of $25,000,000 in long-term bonds to buy park and playground properties in the five boroughs of New York City has been passed by the Board of Estimates and Apportionment.

MEMBERS of the staffs of the New York State colleges have been made eligible to participation in the New York State Employes' Retirement System through a bill recently approved by Governor Franklin D. Roosevelt. Entrance into the system is optional for all present staff members, providing that those electing to enter shall do so on or before January 1, 1931. Entrance is obligatory on all future appointees. The availability of this system to the staff is considered of great importance because of the very serious shrinkage in the pensions granted by the Carnegie Foundation. The state system has a further advantage in that it is applicable not merely to the teaching and scientific staffs, but also to administrative officers, clerks, technicians, mechanics and laborers. The system is a contributory one, individuals making a monthly contribution, deducted from their salary checks, in amounts ranging from approximately 3 per cent. up to 8 per cent., depending on the age at which one enters the system. The amount given by individuals is approximately matched by a contribution from the state treasury. The retirement allowance which may be received at the age of sixty years, with an ultimate compulsory retirement at the age of seventy years, is approximately one seventh of the average salary received during the last five years of the individual's service multiplied by the number of years of service he has given the state.

THE alumni of the College of the City of New York, through their board of directors, recently went on record as opposed to the bill to create a University of the City of New York by combining the present city college, the Brooklyn center of the college and Hunter College under a central board of authority of which the mayor would be the ex-officio head. The following statement has been given out: First and foremost, we are opposed to the bill because it makes collegiate education in New York City a part of the municipal government by placing on the governing board of the proposed university three city officials. We believe that such an arrangement would inevitably bring the undue influence of politics into the system of free higher education in this city. The best authorities on education hold that, as much as possible, education should be free from political control and left in the hands of educational authorities. The people should voice their objections in no uncertain tones. We are uncompromisingly opposed to this bill because it legislates out of existence the College of the City of New York by changing its name to the City College and by reducing it to the status of one of a number of contemplated colleges.

A VOTE to curtail further expansion of shop instruction and vocational training in the Boston public schools was taken by the school committee on April 21, in accordance with a recommendation of the Survey Board: "That further extension of shop instruction in all intermediate schools now under construction or hereafter to be constructed shall be permissive only; that wherever given, instruction shall be limited to the fundamentals of manual training, and shall be general, not vocational, in character; that all equipment shall be inexpensive and shall in no instance include complicated or elaborate machinery. That in all high schools now under construction or hereafter to be constructed, all shops for vocational courses shall be of factory construction and, unless placed in the basement, shall be placed in an annex to the main building; the nature of the shop and all equipment shall be subject specifically and in each instance to the approval of the school committee." Superintendent Jeremiah Burke, in explaining the measure, said in part: "There is no doubt in my mind of the educational value of this work. I believe it is sound and helpful in that it has provided for the boys and girls who are not going onward to the field of higher education. We are faced with the fact that we have been expanding too rapidly in this direction and I find myself to-night in full sympathy with the committee and in agreement with the resolves. I heartily approve of them. I feel called upon to say that the Board of Superintendents also is in sympathy with your action and in accord with your resolution."

THE British Federation of University Women's Camps for Schoolgirls has issued a prospectus of plans for the holidays which it is organizing for the summer. The camps are accommodated in schools, large houses, barns and other buildings in the country or by the sea. About 1,600 girls from high schools and secondary schools attend them each year, under the charge chiefly of university women and teachers, and each of the nine or ten days of the holiday is filled with games and excursions. This year there will be camps at fourteen centers in England, one in Scotland, two in Ireland and five—including one Welsh-speaking center—in Wales. Three senior camps for girls between seventeen and twenty-three years of age are also being arranged.

DISCUSSION

A CLEARING-HOUSE FOR THESES IN EDUCATION

THE eager, interested student beginning work on a master's thesis or a doctor's dissertation is often troubled by the question, What if some one else completes this study before I do? He wants the assurance that when he is through with his arduous labors he will receive the reward that is his right. The seriousness of this as a source of worry and uneasiness will depend naturally upon the temperament of the student. Should it ever involve the disappointment of a student completing the work for the doctor's degree it would become a serious issue. The writer has never had any graduate student meet with this sad fate, though there are numerous proverbial cases going the rounds in which a student was actually refused a doctor's degree because of the priority of another student in a different institution, who had completed the work on the same topic.

Another aspect of this duplication of thesis is the waste involved. A tremendous amount of effort is expended yearly on various studies which are available only in libraries of state universities. Doubtless much of this material is inconsequential. However, a technique of some interest or a compilation of data of value is sometimes included in a master's thesis of use to others elsewhere. The requirements regarding the publication of doctors' theses aids in the wider dissemination of information thus accumulated, but the master's thesis ordinarily reaches few outside of the particular institution. If some method could be devised whereby there could be a central collecting station for such information, doubtless many students working on related problems would be greatly helped, some duplication avoided and the anxiety of another's priority relieved.

The suggestion in this paper with regard to the avoidance of duplication and the wider dis-

semination of the information contained in masters' and doctors' theses is that there be a central collecting station or library where this material may be gathered for indexing and for circulation. This central organization would be a place to record topics, so that a student beginning work on a certain problem would be assured of priority in case his topic were recorded at this place in advance of others. The recording of a topic would probably include not merely a title but also an outline of the proposed thesis. Obviously, two persons might be working on the same topic and yet do it so very differently that both studies would be of educational and scientific interest, and no true duplication occur.

It might be possible that some educational foundation, or perhaps an educational society, would be willing to organize this bureau and provide the necessary clerical help. Office space would be required and a permanent, full-time secretary. Details of the organization and administration of such a bureau would doubtless be left to a committee for formulation. Obviously a certain amount of experimentation would be necessary before a satisfactory plan could be devised. Thereafter when a student decided upon a master's thesis, he could discover whether or not his topic was duplicating another, and could find out whether students at work on related topics in other institutions could be of use to him in answering questions that he was desirous of knowing about. Further, he could borrow from the central office a copy of other theses in which he was interested. At the present time it is only at an occasional educational conference that one learns of the fact that some one in another institution is working on a similar problem and along somewhat similar lines. Often a pooling of experience and information would have been of considerable value. In other words, in return for the service of recording a thesis topic and outline and of circulating theses from other institutions, it would be understood by the colleges of education in the various universities that every student completing a doctor's or master's thesis would be required to send a typewritten copy of his thesis to this central station. This would not involve any very serious expense to the student, as ordinarily three copies are made of a thesis and a fourth could be added with little extra cost.

Of course, any committee considering this problem may wish to raise a rather fundamental question in the matter of theses, namely, whether the master's thesis is undertaken for the purpose of training in method or for the purpose of obtaining new knowledge. This in turn would possibly raise a prior question, namely, whether the master's degree should require a thesis or should not. Some universities at the present time make it possible for the student to evade the thesis requirement by taking additional courses. Many students now undertaking masters' theses need the status of the degree and yet lack the scientific or literary aptitude to write out a master's thesis. It would certainly be of great help to university staffs if such individuals could be permitted to evade the requirements of a written thesis. In view of the type of training which precedes the master's degree, it is a question whether the master's thesis should be undertaken with a view to obtaining new knowledge. It may serve best as a training in experimental or statistical techniques.

NORMAN FENTON

CALIFORNIA BUREAU OF JUVENILE RESEARCH

USEFUL MATHEMATICS

MUCH has been written about the supposedly useless mathematics which appears in many of our text-books, but it has not always been sufficiently emphasized that the mathematics which is used after the schooldays depends largely on the intellectual atmosphere in which these days are spent. This atmosphere varies widely with different individuals and is greatly influenced by their earlier training. As life becomes more and more complex there is an increasing need for mathematical thinking. A tenant farmer who had been in the habit of furnishing half of the seed wheat agreed to give to his landlord three fifths of the crop provided the latter would furnish all the seed wheat. He and his family were thus compelled to suffer still greater privations as a result of his inability to solve a simple problem in fractions with a clear insight into the meaning of the result.

The test of useful mathematics is not absolute but relative, and the amount of useful mathe-

matics in the future can not be fully determined by the amount that was useful in the past. With the increase in competition there naturally goes an increasing need for mathematics in various fields of work, and the rapid increase in college-trained men implies that the competitors will make a more and more careful study of the principles involved in their work. Some of our soldiers in the late war had to be more highly trained in mathematics because the enemy had had such advanced training. While Caesar was not a mathematician in the modern sense of this term he was unusually mathematically minded for the age in which he lived, as is evidenced by his interest in the reform of the calendar and the extensive surveys of the Roman empire which he inaugurated.

Mathematics is so interrelated that the more elementary parts thereof are frequently employed in the more advanced parts, and the latter often furnish a very effective drill in the use of the former. It is not sufficient to prove a theorem; it is also necessary to use it in various ways in order to understand it fully. Hence it is desirable to study some mathematical subjects of which no direct use is likely to be made in the post schooldays. The modern wide interest in mathematics is commonly traced back to the establishment of engineering schools, especially the École Polytechnique of France. The high mathematical standards of this institution have seldom, if ever, been attained elsewhere, but this influence has been felt very widely. Ever since the times of the ancient Greeks mathematics has often been highly praised as a means for intellectual growth, but its popularity is more largely due to its usefulness in times of keen competitions relating to war or to other business enterprises.

As mathematics is abstract it is essentially a post-mortem subject in the sense that the formulation of general abstract principles generally implies a disregard of multitudinous distinguishing features of living objects. It would be difficult to determine whether two visible things are exactly alike in every detail, yet in mathematics we say that one and one are two. We do not say that one and one are the more nearly equal to two as the two things under consideration are more nearly alike. Mathematics is based on the consideration of similarities so that not only one man and one man are two men but also one man and one cow are two animals. In fact, we go much further when we say one and one are exactly equal to two, and it is very interesting to note that such abstractions were employed very early in the intellectual development of the human race so that the ancient Sumerians used the word *sar* for the universe as well as for 3,600, which apparently implies that 3,600 was the upper limit of their system of abstract numbers at that time.

The main object of this note is to emphasize the fact that since it is desirable that we know a little more mathematics than our competitors, both in times of war and also in times of peace, there is no such thing as a limit to the amount of useful mathematics even from a practical point of view. This does not imply that mathematical knowledge is always the most useful or that the different types of mathematical knowledge are equally useful. The agitation to improve mathematical instruction is laudable, but it would be wiser to advocate changes on the ground of the greater effectiveness of other types of knowledge than on the ground that much that is being taught in mathematics is actually useless. The fact that all the numbers which are explicitly mentioned in the Bible are less than one million is interesting, but it is now known that much larger numbers were occasionally used at an earlier date.

G. A. MILLER

UNIVERSITY OF ILLINOIS

SPECIAL CORRESPONDENCE

AN EXPERIMENT IN SOCIALIZING SCHOOL CONTROL

THE traditional idea of the divine right of the teacher to rule has given way to a more democratic conception of maintaining order. Modern study of children has disclosed undreamed-of resources for wise self-direction. Through experiments, it has been determined that a more economical means of attaining favorable working conditions may be had by enlisting the

cooperation instead of the opposition of the child's social impulses; that the making of rules and regulations and the faithful carrying out by pupils of those made have the highest educative and moral value. In order that children in their care may get this training in self-government, many teachers have favored the formation of "school cities" and the like, and have encouraged the adoption of such organizations in the high schools.

Three years ago, a plan of student self-government was adopted in the Teague High School, a high school with an enrolment of more than two hundred and fifty pupils. The plan originated in the civics class, and a committee from that class, with the aid of the teacher, drew up a constitution. This constitution was submitted to the student body, and they voted to accept it.

The constitution provides for a president and a vice-president of the student body, a council composed of students and a sponsor for the council, who is a teacher.

The president and vice-president are elected by ballot; the one receiving the highest number of votes is declared president, and the one receiving the next highest number of votes is declared vice-president. The president presides over the council when it meets, but votes only in case of a tie, and has veto power over the acts of the council. He has power over the council when it is in session, is speaker of the council and acts only jointly with the council. No person is eligible for the office of president or vice-president unless he is a junior or senior in good standing and is passing in his school work. Before the president enters on the execution of his office, he takes an oath solemnly swearing, or affirming, to execute faithfully the office of president of the student body, and to preserve, protect and defend the constitution of the school to the best of his ability.

The council consists of two members from each grade in high school, one of whom is a girl and one a boy. They are elected by the pupils of their grades to represent them. The council has power to punish students for truancy, tardiness and other misbehavior. It at all times acts as a court in trying cases. The president is the judge, and the defendant is allowed to defend himself or to have an attorney. The council-men are the jury. The council also has the power to appoint committees with one of the council-men acting as chairman; to amend the constitution with the two thirds vote of the council-men and the sanction of the sponsor, and to make all laws necessary and proper for carrying into execution the powers vested by the constitution in the government of the high school.

The superintendent of the high school appoints the sponsor who is in actual charge of the council. The sponsor has veto power over the acts of the council, has power to fill all vacancies that appear in the council and to remove from office any person who disobeys the rules of the council. The sponsor can be removed only by the superintendent of the high school.

The other officers elected by the student body that the constitution does not provide for are attorney, fire marshal, yell leader and clerk. These officers may be chosen from any class in the high school.

The first time officers were elected, the election was carried on in a way similar to a convention. At an assembly of the entire high-school student body, two or three students were nominated for each office to be filled, and they were voted on by a rising vote. This method did not meet with the approval either of the teachers or of the more enthusiastic pupils. All the evils of a presidential nominating convention were noticeable. The majority of the students followed the man who could make the most noise, so if a candidate had a noisy spokesman, his chances for election were increased very much. Now, the elections are conducted very much like our city and county elections. A certain day is designated as election day. An election judge and his helpers are appointed; distance markers are placed on the doors of the auditorium as the election is held on the stage in that room, and the polls are opened and closed at stated times on the day set aside as election day. Before the election, the pupils pay their poll taxes, usually two cents, get their receipts, which they frequently lose, whereupon the judge of the election makes

them affirm, or swear, that they have paid their poll taxes.

The pupils who think they would like to have a certain position and who think they are capable of holding the position announce their candidacy for it. They write their platforms, which the teachers will help them write if they want them to, and appoint their campaign managers. Each candidate and his campaign manager go from room to room during sponsor period and make speeches. The platforms of the candidates are sometimes read at these periods and they are always printed in the high-school paper. Sometimes the candidates have tags printed and insist that their supporters wear their tags. In one election, the names of the two boys running for president were Weldon Owens and Riley Ham. Weldon's tags read, "Let it be Well-Done for president," and Riley's tags read, "Vote for Ham, the Man What Am." Another time, one of the candidates for president had tags that read, "Be for Bee," and her opponent's tags read, "The Webb that catches the Bee." Such campaigns appeal to the pupils, and they become more interested than they otherwise would. The teachers have never interfered in any way with the methods of the pupils, nor have they taken sides except to help them write their platforms.

The council acting as a court has handled all cases of tardiness, and has reduced these cases considerably. The pupils who were continually getting to school late did not mind the principal's punishment, but they did not relish punishment assigned by their fellow-students.

Three special committees sponsored by the council that have done worth-while work are a clean-up committee, a yard committee and a traffic committee. The yard committee has for its purpose beautifying the school grounds, while the clean-up committee sees that they are kept clean and attractive. Each sponsor group is assigned a definite part of the grounds to keep clean and is told what kind of shrubs to set out and what kind of flowers to plant.

The work of the traffic committee, however, has possibly been of more value to the teachers than that of any other committee. The teachers had had endless trouble with congestion and disorder in the halls and on the stairways. Telling the children where to stay did not seem effective; getting to their classes was their aim. The council took the matter in hand, and a special committee worked out a method for using the stairs going up and down. The plan was laid before the student body and was accepted. Six traffic cops were appointed, one for each stairway on each floor. A second violation of a traffic rule brought a student to court, and after a hard-headed fellow had had to stay after school for several hours he was ready to stay in line. By this method, congestion and disorder in the hall were reduced to a minimum.

At first there were some abuses. Some teachers who were weak in discipline thought the council should look after their bad children. This presented some difficulty because the council could not criticize the teacher. The principal managed to let the teachers understand that the council did not attend to such matters, and they have had no trouble with that since. One woman even suggested that the council investigate some matters that belonged to the city court.

The objective of the whole project is to give pupils training in citizenship. The sponsor of the council says that all that the teachers had expected along this line is being accomplished and that the girls more especially are getting valuable helps toward citizenship. The council has responded beautifully to the suggestions made by the sponsor, and it has set about putting its regulations into effect with much vigor and determination to have them succeed. The gravity with which the court has gone about its work is admirable. Both the students and the teachers think that much has been gained through this organization.

JOYCE BENBROOK

FULSHEAR, TEXAS

WOMEN BOTHERING THE BRITISH SCHOOL BOARD

LIKE the golden flowers springing up in new spots of the lawn to the despair of the gardener, the question of woman's worth in education blossoms, now in New Jersey, now in Moscow. The Royal Commission on the Civil Service, taking testimony in Lincoln's Inn, London, is the latest important body to be bothered by the problem. Sir Aubrey Symonds, permanent secretary of the British Board of Education,

has given his testimony. Lord Tomlin, chairman of the commission, wants to know about women as school inspectors.

Sir Aubrey says they were introduced to assist the male section of the board on particular subjects of education. There have been women school inspectors since 1904.

"Should all educational posts be open to men and women alike?"

"I could not agree to that. Every director of education is a man. Perhaps the school people prefer to do business with men. But we are in the middle of a change in the educational system of this country. This is the worst time for us to make radical changes, whatever we may be able to do in the future. I do not question the ability of women, but I question their suitability for the posts in which the occupants have to deal as directors with local school authorities."

Mr. Goldstone, secretary of the National Union of Teachers and a member of the commission: "Is it a fact that head mistresses of girls' secondary schools prefer men?"

Sir Aubrey: "It is curious, but it is a fact. I shall be glad of the opportunity to appoint women or men indiscriminately as subject-experts, but I should take care not to appoint too many women because some of the schools want to be directed by men only."

Mrs. Hamilton, a member of the commission: "Is it due to the policy of the Board of Education that men in school circles are more afraid of women than men are in the political world? Harrow, for instance, would be horrified by a woman inspector?" (Laughter.)

Sir Aubrey: "I would not say horrified. Perhaps they would not want her."

Mrs. Hamilton: "Isn't it a fact that schoolmen harbor a distrust of the educational qualifications of women?"

Sir Aubrey: That attitude exists, but it is disappearing. Yet the time is not near when schools like Eton, Rugby and Harrow would want a woman inspector. That kind of school is a very conservative institution."

Mrs. Hamilton: "A change of atmosphere might do them good."

Sir Aubrey: "I should not mind an experiment. The old theory persists that the masculine mind is better than the feminine in education. I think it's foolish, myself."

Mrs. Hamilton: "Your board's policy of separating boys from girls isn't very helpful in breaking down the opposition to women."

Various women appeared and urged equal chances for both sexes in the educational posts. The women have the inferior positions. The divisional and district inspectorships are held by men. Equality of opportunity, status and pay were urged. Dr. J. B. Baillie opposed this.

Miss Tann, an elementary inspector: "The women have as much administrative ability as the men. They demonstrate it in business and in politics. In education you don't give them a chance to show it."

Dr. Baillie: "Are men incapable of examining in girls' schools?"

Miss Tann: "Some are not incapable, but cooperation between men and women inspectors is needed. If women were taken more into the making of educational policies the schools for both boys and girls would improve. The women inspectors are mostly university women. The majority have been head mistresses or assistants in secondary schools."

To any American sixty years of age or over, this sounds like professional discussion in school circles of the United States forty years ago.

WM. MCANDREW

QUOTATIONS

TRAINING FOR SCHOOL ADMINISTRATION

DURING the last quarter of a century, with its tremendous development of our state and city systems, school administration has grown to be of major importance. No one has spoken more authoritatively on the subject than Dr. George D. Strayer, who has just completed twenty-five years of service at Teachers College. It is stated that he has trained or helped to train more teachers of school administration than any one else in the country. Since he wrote as a young man his doctor's thesis based upon a study of school expenses, school administration

has become a profession, with a body of scientific data available for guidance. There are recognized standards. For the first time in the history of the world, to quote Dr. Strayer himself, "schools have been organized and administered by men and women who measure results, who recognize the facts of individual differences and who have sought diligently to adjust their schools to the needs and capacities of those registered with them."

Dr. Charles F. Thwing in his review, in last Sunday's *Times*, of the year in higher education notes this same individualizing of instruction in the colleges. They are realizing that "the current mass-education is no education." In the lower ranges of education we are beginning, thanks to such services as those of Dr. Strayer and his associates, to adjust the schools to the needs of individual boys and girls—to define anew "the concept of equality of opportunity," for that equality is not to be found in mere uniformity. It is necessary to refine our methods of organization and classification of students.

A beginning has been made, but more and more it must be realized that men need to be as highly and specially trained for this profession as are doctors and lawyers for theirs. One may go even further with Dr. Strayer and argue that the need for a sound liberal education and for a prolonged period of training is greater for the man who would administer public education than for those who engage in the private practice of law.

Dr. Strayer's catalogue of the essential qualifications of a superintendent of schools leads one to ask where such an administrative paragon can be found. But the way should be open to this highest public office in any community when the man is found. It may take twenty-five years more to make the public acquainted with the importance of the school service, and to make that type of superintendent general.—*The New York Times.*

ENGLISH CHURCH SCHOOLS

A DEFINITE step towards the improvement of our national system of education is recorded to-day with the issue of an official scheme whereby Church of England schools, and those of other denominations, will be enabled to join in the reorganization outlined in the Hadow Report without any sacrifice of the principles for which they stand. Hitherto church schools, built in the past by money provided by church-people, have not shared in the grant of public funds with which the state schools have been established. The country has now decided that all children shall receive their education in two separate forms—elementary teaching from five to eleven years of age, and secondary teaching for three or perhaps four years after the age of eleven. In order to enable the local authorities to prepare for this change, a special grant is to be given them for the building of new schools or for the reconstruction of old ones. Under the present practice church schools can not share in this grant, and unless they do so many can not afford to join the national system, as is clearly desirable, not only from the point of view of the church but also from that of the nation.

As the White Paper states, reorganization "depends on the extent to which the voluntary schools are able to play their part." Under the present proposals local authorities can give financial assistance to church schools—out of the new grant—"in exchange for an extension of public control in the matter of the appointment and removal of teachers." Children transferred from a church to a state school can be withdrawn, at their parents' demand, for special religious instruction outside the school. So far as can be judged in advance, this scheme ought to work without friction. Public opinion is far more anxious for a settlement now than it was twenty years ago. Sectarian bitterness has died down since the war. "His Majesty's Government feel justified in stating their belief that a measure of agreement may be found" on the basis of these proposals. If it can be found, all men of good will should welcome what seems to be a fair settlement of an old and stubborn controversy. A settlement on some such lines is clearly in the interest both of the nation and of the national religion. As the text of the resolution just passed by the National Union of Teachers makes plain, there are many points of controversy yet to be settled. All, however, are details compared with the basis of agreement that has been reached.—*The London Times.*

EDUCATIONAL RESEARCH AND STATISTICS

A COMPARISON OF ENGINEERING FRESHMEN OVER AN INTERVAL OF TEN YEARS

ON November 5 and 6, 1919, all engineering freshmen at Purdue University were tested as a part of a much larger investigation carried out by the Society for the Promotion of Engineering Education. The tests administered at that time consisted of the Thurstone Vocational Guidance Tests[1] as given in Table I.

The tests were again administered to the engineering freshmen at Purdue University exactly ten years after the 1919 investigation, *i.e.*, on November 6, 1929. In addition to this, the Purdue English Test,[2] Form 1, was also administered both in 1919 and 1929.

Table II shows the percentage of the 1929 freshmen surpassing the average of 1919 on each of the tests. For the year 1919 the percentage exceeding the average is in every case 50.

A fact that should be noted here is that in 1919 the freshmen engineering mathematics was differently organized in that trigonometry came at the beginning of the semester while in 1929 college algebra came first. While students do get a slight review of algebraic principles and manipulations in trigonometry, the amount and variety of this is not to be compared with that gained in beginning college algebra.

With all due allowance, however, for the influence of such review, the argument can not be extended to cover the increases in the other

TABLE I

COMPARISONS OF AVERAGES FOR PURDUE UNIVERSITY ENGINEERING FRESHMEN, 1919 AND 1929, FOR THE TESTS INDICATED

	Tests						Number of students for each test for the two years					
	Arithmetic	Algebra	Geometry	Physics	Technical information	English	Arith.	Alg.	Geom.	Phys.	Tech. Info.	Engl.
1929 Av.	11.3 ± .09	4.7 ± .05	9.7 ± .08	10.7 ± .11	62.1 ± .24	123.8 ± .43	957	942	926	926	905	896
1919 Av.	10.3 ± .11	2.8 ± .06	7.8 ± .10	9.8 ± .14	62.2 ± .29	114.2 ± .54	593	594	589	590	584	670
Difference	1.0 ± .14	1.9 ± .08	1.9 ± .13	.9 ± .17	.1 ± .39	9.6 ± .69						
Diff. / P.E.$_{diff.}$	6.8	23.5	14.6	5.3	0.3	13.9						
In favor of	1929	1929	1929	1929	1919	1929						

This table is read: The average score in arithmetic in 1929 was 11.3. In 1919 it was 10.3. The difference of these two averages is 1.0, with a probable error of .14. The difference divided by its probable error is 6.8. Where this ratio is at least 4, the difference is statistically significant, *i.e.*, it could never occur by chance.

TABLE II

THE PERCENTAGE OF 1929 FRESHMEN ABOVE AND BELOW THE 1919 AVERAGE

	Percentage above 1919 average*	Percentage below 1919 average*
Arithmetic	60	40
Algebra	81	19
Geometry	70	30
Physics	57	43
Technical information	50	50
English	70	30

[1] For a detailed description of the tests and the results of the investigation see L. L. Thurstone, "Intelligence Tests for Engineering Students," *Journal of Engineering Education*, 13: 287–318, 1922–1923.

[2] Devised by G. C. Brandenburg. The test is made up of seven different parts covering grammar, punctuation, diction, literary information, two short reading paragraphs, spelling (recognition of misspellings) and vocabulary (synonyms).

* These percentages are based upon the assumption of a normal distribution, and were read from a table of areas under the normal probability curve. See Garrett, "Statistics in Psychology and Education," pp. 89–91.

tests such as arithmetic, geometry, physics and English, all of which show a very substantial and significant superiority in 1929.

Nor is there any reasonable basis for assuming a more rigorous selection on the basis of native ability at present as against ten years ago.

How then are the differences to be accounted for? The most reasonable assumption is that secondary schools are at present substantially better from the standpoint of equipment and teaching personnel than they were in the period immediately preceding 1919. Within the ten-year period covered by this study substantially higher standards have been set for the admission of secondary school teachers to the teaching profession.

Another possible factor is the war. Many of the male high-school teachers volunteered for war service and were replaced in the profession by less experienced and less well-trained individuals. This, however, could have influenced only the achievement in physics and to some extent possibly in English, and not in arithmetic, algebra and geometry, for the 1919 freshmen were juniors in high school during the war period in question, and algebra is taught in the high-school freshman year while geometry comes normally during the sophomore year. Very little weight is therefore to be attached to this variable—all the more so when it is recalled that the proportion of male teachers in our public schools is quite small. The majority of 1919 Purdue University freshmen were taught in high school by women, who were not affected by the situation in question.

In the light of the foregoing discussion the conclusion seems inescapable that after making every reasonable allowance, the major portion of the observed differences must be credited to the improved teaching in our high schools.

When we examine the freshman semester grades for the years 1919–20 and 1928–29, a striking increase in the percentage of failures is apparent. For freshman engineering mathematics the pertinent data[3] are summarized in Table III.

TABLE III

A COMPARISON OF FRESHMAN SURVIVAL AND MORTALITY IN MATHEMATICS FOR 1919–20 AND 1928–29

	First semester				Second semester				First and second semester			
	Passed		Failed		Passed		Failed		Passed		Failed	
	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per. cent.	No.	Per cent.
1928	684	69.3	303*	30.7	584	72.4	223	27.6	1,268	70.7	526	29.3
1919	608	82.6	128	17.4	582	86.9	88	13.1	1,190	84.6	216	15.4
Percentage differences		13.3		13.3		14.5		14.5		13.9		13.9

* Of these 134 were required to register for Mathematics A, a non-credit course. They were failures, then, only in the sense of not being admitted to Mathematics I, where they would presumably have failed.

The increase in freshman mortality has been steadily growing over a period of years, as is evident from the last grade report for the university covering the period from 1920–21 to 1926–27. While freshman grades are not separately given in this report, the percentages give a quite accurate notion of the trend of fresh-

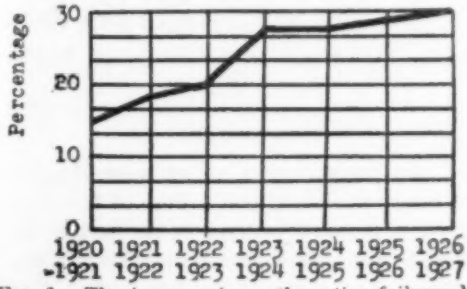

FIG. 1. The increase in mathematics failures by years.

[3] For these data I am indebted to Professor W. Marshall, head of the department of mathematics.

TABLE IV

A COMPARISON OF FRESHMAN SURVIVAL AND MORTALITY IN ENGLISH FOR 1919–20 ENGINEERS AND THE ENTIRE 1928–29 FRESHMAN CLASS

	First semester				Second semester				First and second semester			
	Passed		Failed		Passed		Failed		Passed		Failed	
	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per. cent.	No.	Per cent.
1928	881	69.5	387	30.5	729	81.4	167	18.6	1,610	74.4	554	25.6
1919	654	93.3	47	6.7	633	98.6	9	1.4	1,287	95.8	56	4.2
Percentage differences		23.8		23.8		17.2		17.2		21.4		21.4

man failures (not, however, of the freshman percentages, which are considerably higher), since their grades constitute more than half of all mathematics grades.

The comparable data on student survival and mortality in freshman English for 1919–20 and 1928–29[4] are given in Table IV.

The trend in English has been the same as in mathematics—a rather steadily increasing percentage of failures from 1920–21 to 1926–27. Fig. 2, based upon the grade report previously mentioned, shows the trend graphically for all English grades. Here again it is to be remembered that the percentages for freshmen would be very much higher than those shown in the graph.

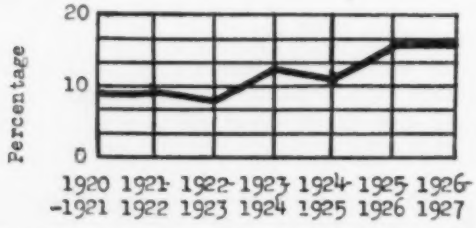

FIG. 2. The change in percentage of English failures by years.

CONCLUSIONS

In the interpretation of an assemblage of data beset by so many possibilities of fortuitous influences, it would perhaps be the part of discretion to allow the reader to draw his own conclusions. At the risk of being indiscreet, then, I shall venture to suggest that the data support the following generalizations.

1. The engineering freshmen of Purdue University in 1929 are superior to those of 1919 with respect to scholastic preparation.

2. The observed superiority is probably in the main to be credited to improved high-school instruction.

3. The steady increase in freshman failures indicates an increase in the standards of Purdue University rather than a deterioration of the freshman mental material.

H. H. REMMERS

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[4] For the 1928–29 data I am indebted to Professor H. L. Creek, head of the department of English.

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